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Positron annihilation studies of the Fermi surface of rare-earth intermetallic compounds

M. Biasini[1], G. Ferro[1], M.A. Monge[1], G Kontrim-Sznajd[2], A.Czopnik[2], G. Satta[3], S. Massidda[3], P. Lejay[4]

[1] *ENEA via don Fiammelli 2 40128 Bologna Italy*
[2] *Trzebiatowski Institute of Low Temperature and Structural Research P.O.Box 937 Wroclaw Poland*
[3] *Universita' di Cagliari Dip.to di Fisica I-09124 Cagliari*
[4] *CRTBT, Av. de Martyrs BP 166, 38042 Grenoble Cedex 9, France*

i) We carry out measurements of the 2-dimensional angular correlation of the positron annihilation radiation (2D-ACAR) to reconstruct the complex multi-sheet Fermi surface (FS) of the rare-earth system $TmGa_3$. The resulting FS is in fair agreement with band structure calculations which constrain the 4f electrons to retain a local atomic character. Moreover, we discover a correlation between the antiferromagnetic ordering and the nesting of the FS along the [110] directions [M Biasini et al. Phys. Rev. Lett. 86, 4612 (2001)].
ii) 2D-ACAR measurements on the archetype heavy fermion system $CeRu_2Si_2$ were performed above the Kondo temperature T_K and compared to those of the reference isostructural non f-electron system $LaRu_2Si_2$. The 3D k-space densities of the two compounds were very similar. These results are in reasonable agreement with the band structure calculated for $CeRu_2Si_2$ using the local density approximation (LDA). Conversely, a clear discrepancy between the LDA calculation for $LaRu_2Si_2$ and the experiment appears unless the Fermi level is raised of 11mRyd. After the adjustment in E_F the calculated FSs are rather similar and in agreement with both experiments.